InterICE

Ice core treatment procedure utilized by Arctic and Antarctic Research Institute (AARI) – Russian Antarctic Expedition.

Curator of Russian ice core collection:
Dr. Vladimir Ya. Lipenkov (lipenkov@aari.nw.ru)

Field procedure for 5G and 5G-1 ice core

After each drilling run, retrieved ice core is transferred to the core storage (temperature -50…-55°C) and kept there few hours to let the drilling fluid evaporate. Then ice core is cut into 1-m pieces which are warmed up in a thermostat to the temperature of -15°C. Then, thin slices are cut from the core (along core's axis) to be measured for ^{10}Be and isotope composition. One of the slices is used for thin section analyses. The total thickness of ice cut from the core is about 2 cm. Then, ECM is measured continuously along the fresh flat surface of the remaining core.

The remaining part of the core is cut along its axis into two equal pieces (from the depth of 3350 m): one is kept at Vostok as an archive collection, the other has been shared between Russia, France and the USA. See the cutting plan in our presentation.

In the core storage, each piece of ice has its label at which the following information is given:

- N of SAE (Soviet Antarctic Expedition) or RAE (Russian Antarctic Expedition) (e.g., 15 SAE = 1970, 16 SAE = 1971, 45 RAE = 2000 and so on);
- Identification of borehole (e.g., 3G, 5G-1, Komsomolskaya…);
- N of 1-m piece of ice (at the same time it corresponds to the depth of the bottom of this ice core piece);
- Sometimes also the depth interval is written.

Ice core is stored in plastic bags tied with a rope. This allows eliminating the air from the bag and utilizing the bag several times.

Core storage

There are 5 core storages at Vostok Station with mean annual temperature of about -55°C in each. Two of them are at the level of snow surface and three are under snow. Ice core from all the boreholes drilled by Russian Antarctic Expedition is stored there. Low temperature allows preserving physical and chemical properties of the core for many years.

In Arctic and Antarctic Research Institute there is a cold room where small amount of core (about 2-3 boxes) can be stored.

Core accession

According to the agreement between Russia, France and the United States, ice core from 5G and 5G-1 boreholes down to the depth of 3623 m has been shared equally (50/50/50 cm) between these three countries. All the other cores retrieved or to be retrieved as a result of activity of Russian Antarctic Expedition (including new ice core to be drilled in 5G-1 borehole below 3623 m) is a property of Russian Federation.

Ice core from French and American part of 5G and 5G-1 collection is delivered to France and the US on receiving corresponding request from these countries.

For the Russian ice core collection, procedure of the access to the core is following:

Interested researcher or organization addresses the corresponding request to the Curator of Russian ice core collection. The request must contain the scientific program of the planned studies. The request is considered by commission consisting of specialists from AARI. In case of positive decision, the commission recommends delivering ice core to the researcher. Then, Director of AARI gives the corresponding order to the Curator.

Transportation

Until last year, transportation of ice core to Russia was carried out by the following way:

From Vostok ice was sent by cold deck (C-130 flight) to American McMurdo Station where it was stored in a cold storage. Then, ice was shipped to France through Christchurch (New Zealand) in refrigerators. In France, ice was stored in the cold storages of LGGE. For transportation of ice to St. Petersburg (Russia) the ship of Russian Antarctic Expedition ("Akademik Fedorov") was used. On its way back from Antarctica "Akademik Fedorov" calls the port of

Bremerhavn. By the day of the ship's departure from the port, the ice was sent to Bremerhaven and delivered to the board of "Akademik Fedorov". On board, ice was stored in the refrigerators until arriving to St. Petersburg. To avoid problems with Russian customs, ice was declared as a part of scientific cargo. In St. Petersburg, ice boxes were received by people from AARI and transported to the cold rooms of AARI. Further transportation of ice samples to interested researchers is their own responsibility.

Starting from this year, transportation of ice through McMurdo is under question, so the alternative way of transportation must be found between Vostok and Europe.

Ice core processing

At Vostok, the only measurements made in the field are ECM and thin-section studies. The studies of bubble and hydrate ensembles in the Vostok core were performed on the fresh ice and ice samples stored at –55, which allowed to reveal the original (in situ) shape of the air inclusions and to precisely determine geometrical properties of their ensembles in ice.

Alexey Ekaykin,
Arctic and Antarctic Research Institute
38 Beringa st., 199397 St. Petersburg, Russia
Tel.: 7–812–352 22 46 (**the same number is for Dr. Lipenkov**)
Fax: 7–812–352 26 88
E-mail: ekaykin@aari.nw.ru